Frequency of consumption of fruits, vegetables and soft drinks: a comparative study among adolescents in urban and rural areas

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ABSTRACT: Objective: To compare the frequency of consumption of fruits, vegetables and soft drinks among adolescents living in urban and rural areas of Pernambuco State. Methods: A cross-sectional study based on secondary analysis of data from a representative sample of high school students in Pernambuco (n = 4,207, 14 – 19 years) was conducted. Data were collected through a previously validated questionnaire. Adolescents who reported a daily consumption of soft drinks and occasional consumption of fruits, juices and vegetables were classified as exposed to inadequate standard of consumption of these foods. The independent variable was the place of residence (urban/rural). Data were analyzed by frequency distribution, χ² test and binary logistic regression. Results: It was observed that students residing in rural areas had a higher prevalence of occasional consumption of natural fruit juices (37.6%; 95%CI 36.1 – 39.0) than those living in urban areas (32.1%; 95%CI 30.7 – 33.6). The proportion of students exposed to daily consumption of soft drinks was higher among those who reported they lived in urban areas (65.0%; 95%CI 63.5 – 66.4) compared to those who reported living in rural areas (55.3%; 95%CI 53.8 – 56.9). Conclusion: Adolescent students living in rural areas had a higher prevalence of low consumption of natural fruit juices while those residing in urban areas had a higher prevalence of daily consumption of soda drinks.

Keywords: Food consumption. Adolescent. Urban population. Rural population. Epidemiology. Brazil.
INTRODUCTION

The frequency of food consumption is associated with several socioeconomic, demographic, personal and environmental factors, such as gender, age, economic status, place of residence, nutritional knowledge, attitudes, self-efficacy, perceived barriers, family size and structure. Daily consumption of healthy food such as fruit and vegetables, is related to the availability, accessibility, cost, and quality of the food.

International and national studies suggest that dietary patterns may differ between populations in urban and rural areas due, greatly, to the particular phenomena of each region, such as, for example, the fact that the population residing in rural areas have lower level of education and income. Furthermore, people residing in rural areas may face some challenges that impact on health, such as social isolation and limited access to transportation, installations and health services. Moreover, the dietary habits of the urban population present a considerable reduction in household consumption of food which require longer preparation time, such as rice, beans and roasted potatoes.

Changes in the eating habits of the urban and rural population have been observed in national and international surveys which focus on population in general. In the Household Budget Survey (HBS) 2008 – 2009, it was observed, in the urban area, a tendency to decreasing intake of fruit and vegetables and an increase in the daily consumption of food with high sugar and fat quantities, such as soft drinks, bread, beer, pizza and filled cookies, while in rural areas, there was a higher consumption of fruit and vegetables.
rural population there was a tendency to increasing the intake of grains and fish. A study carried out in Cameroon (Africa) by Dapi et al.\(^8\), with teenagers (12 – 15 years of age), identified that the frequency of meat, vegetables, cereals, milk and food with low nutritional value consumption was significantly higher among those living in urban areas than in adolescents living in rural areas.

Adopting healthy eating habits in childhood and adolescence is important, considering that these are critical periods of growth and development\(^1\). Studies indicate that eating habits acquired and consolidated in these phases tend to be kept throughout adulthood\(^12,13\). However, it is noticeable that adolescence is also a period which tends to the development of effective interventions in the promotion of healthier eating habits\(^14\). This makes the increase of consumption of healthy foods in childhood and adolescence an important public health issue\(^1\).

Although dietary patterns are known to vary according to the socioeconomic status and to the geographic region\(^6\), little is known about the eating behaviors of children and adolescents living in rural and urban areas in the Northeast of Brazil. Assessing the dietary intake by place of residence is an important strategy to better know the nutritional status of the population and to make possible the planning of appropriate intervention programs. Given the above, the present study aimed at comparing the frequency of food consumption among high school teenagers from urban and rural areas of the state of Pernambuco.

**METHODOLOGY**

This study resulted from a cross-sectional epidemiological survey, school based and statewide, entitled “Lifestyle and health risk behaviors in high school students in the State of Pernambuco”, developed by the Research Group of Lifestyles and Health of the Universidade de Pernambuco. The study protocol was approved, in 2005, by the Ethics Committee of Human Research of the Hospital Agamenon Magalhães de Recife (PE), Brazil, and all the ethical principles contained in the Declaration of Helsinki were observed throughout the conducting of the study.

The target population was limited to students from state public high school, aged from 14 to 19 years of age. Considering all the administrative regions (federal, state, municipal and private), students enrolled in state public schools represented, at the time of the survey (2006), approximately 80% of all high school students throughout the state. The dimensions of the sample were determined in order to meet the various objectives of the project, covering the determination of the exposure prevalence to various behavioral and biological risk factors to health.

In order to calculate the size of the sample, the following criteria were followed: estimated population around 353 thousand students; 95% confidence interval (95%CI); tolerable sampling error of 3 percentage points; estimated prevalence of 50%; effect of the
sample delineation at 4 times the minimum size of the sample. Based on these parameters, the size of the sample was estimated at 4,217 subjects. Considering the analytical component of this study, it was calculated, afterwards, that the achieved sample size would allow detecting as significant odds ratios (OR) of 1.2 or higher, to be examined: prevalence of the outcomes between 32 and 65% in the exposed ones and between 28 and 67% in the unexposed ones; statistical power of 80%; 95%CI.

It was tried to ensure that the selected sample represented the target population, considering its distribution according to geographic region, period of enrollment (day and night) and size of schools (small, with fewer than 200 students; medium, with 200 to 499 students; and large, with 500 students or more). Students enrolled in the morning and afternoon periods were grouped into a single category (daytime students). The regional distribution was observed by the number of existing schools in each of the 17 Regional Offices of Education in the State.

For the selection of the sample, it was used a procedure of cluster sampling in two stages, the “school” and the “class” representing, respectively, the sample units in the first and second stage. All state public schools offering the regular high school course were eligible to be included in the study. In the first stage, it was adopted, as a stratification criterion, the proportional distribution of schools in each micro-region of the state according to their size. In the second stage, it was considered the distribution of classes in the selected schools by period (day and night) as a criterion to draw those in which the questionnaires were to be applied. All students enrolled in the selected classes were invited to participate in the study. The draws were conducted by random number generation using the Epi Info 6.04d software (Centers for Disease Control and Prevention, Atlanta, United States).

The questionnaire used for data collection was an adapted version of the Global School-based Student Health Survey (GSHS), proposed and developed by the World Health Organization (WHO) along with other international institutions (available at http://www.who.int/chp/GSHS/en/). The questionnaire was developed as a tool for the assessment of the exposure to health risk behaviors in adolescence and it consists of ten modules: personal information; alcohol and drug consumption; eating habits; hygiene; feelings and relationships; physical activity; behavior in school; sexual behavior; smoking; and violence. In this study, the sociodemographic and behavioral variables were analyzed.

Data collection was conducted, in the period from April to October 2006, by a previously trained team, composed of six graduate students in Hebiatria in the Universidade de Pernambuco, following a standardized protocol for data collection. Initially, a pilot study was conducted in a municipal school of Recife. The data revealed that the instrument has good test-retest consistency of measures and validity of content. The validity of the content was verified by the consulting of three experts (researchers with experience in conducting epidemiologic researches focused on health behaviors), performed during the pilot period. The reproducibility indicators (test-retest consistency of measures) were from moderate to high in most items of the instrument, and the concordance coefficient (kappa coefficient) varied from 0.52 to 1.00.
Self-reported information on the consumption of fruit, natural fruit juice, vegetables and soft drinks were determined by analyzing the frequency of usual food consumption, considering the following answers referring to the last 30 days: did not consume, < once a day, once a day, twice a day, 3 times a day and four times a day or more. Teenagers who reported a daily consumption of soft drinks and occasional consumption (< once a day) of fruit, natural fruit juice and vegetables were classified as exposed to inadequate pattern of consumption of these foods. This dichotomizing strategy was also adopted by Peltzer e Pengpid\textsuperscript{15}, Cavalcanti et al.\textsuperscript{16} and Tasitano et al.\textsuperscript{17}.

In the same way, the place of residence was self-reported by the teenagers, being this variable classified into two categories (urban or rural). The intervening variables were gender, age (14 – 16 years, 17 – 19 years of age) and maternal education (low: \leq 8 years; average: 9 – 11 years; and high: \geq 12 years of education), also used in previous studies\textsuperscript{4,9,18}.

The procedure for data tabulation was performed on a database of the EpiData software (version 3.1). For the analyzes, the SPSS software (version 10) was used, employing procedures of descriptive statistics (relative and absolute frequency distributions). In the bivariate analysis, the study resorted to the application of the $\chi^2$ test. This procedure was used to compare the prevalence of inadequate consumption of fruit, vegetables, natural fruit juice and soft drinks (dependent variables) by place of residence (independent variable).

Association analysis between the independent variable and the dependent variables were conducted by using separately for each of the dependent variables, logistic regression. Initially, raw analysis were conducted and, in the sequence, multivariable ones, which were conducted in order to control potential confounder factors (gender, age, maternal education). In all tests, the adopted level of statistical significance was less than 0.05.

**RESULTS**

From all students between 14 and 19 years of age, present in the randomly selected classes back in the occasion of the visit for data collection (4,269), 55 of them refused to participate and 7 questionnaires were excluded because of incomplete and unconscious data. The final sample consisted of 4,207 teenagers (59.8% female) enrolled in 76 schools in 44 municipalities in Pernambuco. Most students (58%) were aged between 17 to 19 (average 16.8 + 1.4 years of age). About 4 out of every 5 students were living in urban areas (78.9%), 78% did not have a job and 57.5% were studying in the daytime.

In Table 1, the sociodemographic characteristics of the sample by place of residence were presented. Among the variables analyzed in this study, with the exception of maternal education (6.1%), the rate of unanswered questions did not exceed 1.5%.

In relation to food intake, it was observed that 62.9% (95%CI 61.4 – 64.4) of the adolescents were exposed to daily consumption of soft drinks. It was also found that about 1 out of 3 adolescents do not consume fruit, or do it less often than once a day (33.3%; 95%CI 31.9 – 34.8), natural fruit juice (33.2%; 95%CI 31.8 – 34.7) and vegetables (36.3%; 95%CI 34.8 – 37.8).
In the bivariate analysis, it was found that the place of residence was associated to inadequate intake of natural fruit juice ($p = 0.002$) and soft drinks ($p < 0.001$), but it was not associated to fruit intake ($p = 0.387$) and vegetables ($p = 0.565$). It was observed that the prevalence of occasional consumption of natural fruit juice was higher among teenagers living in rural areas when compared to those of the urban area. However, the proportion of adolescents exposed to inappropriate consumption of soft drinks was statistically lower among students who reported residing in rural areas in comparison to the ones from the urban side (Figure 1).

This result remained virtually unchanged, even after the adjustment for potential confounders (gender, age, and maternal education). The chance of exposure to occasional consumption of natural fruit juice was 21% greater among adolescents who reported residing in the rural area in comparison to those who reported living in the urban one. However, the chance of exposure to daily soft drink consumption was 32% lower among students who live in rural areas when compared to those living in urban ones (Table 2).

**DISCUSSION**

The results revealed that the prevalence of occasional consumption of natural fruit juice was higher among adolescents living in rural areas when compared to those living in urban areas (Table 1).
Figure 1. Prevalence of occasional consumption of fruit, vegetables, natural fruit juice and daily consumption of soft drinks by place of residence.

Table 2. Binary logistic regression to estimate the association between place of residence and inadequate consumption of fruit, vegetables, natural fruit juice and soft drinks on adolescents.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Inadequate food consumption</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Raw OR (95%CI)</td>
<td>p-value</td>
<td>Adjusted OR * (95%CI)</td>
<td>p-value</td>
</tr>
<tr>
<td>Outcome: occasional fruit consumption</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>1</td>
<td>1.07 (0.92 – 1.25)</td>
<td>0.387</td>
<td>1</td>
</tr>
<tr>
<td>Rural</td>
<td>1</td>
<td>1.05 (0.90 – 1.22)</td>
<td>0.565</td>
<td>1</td>
</tr>
<tr>
<td>Outcome: occasional vegetable consumption</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>1</td>
<td>1.27 (1.09 – 1.48)</td>
<td>0.003</td>
<td>1</td>
</tr>
<tr>
<td>Rural</td>
<td>1</td>
<td>0.67 (0.57 – 0.78)</td>
<td>&lt; 0.001</td>
<td>1</td>
</tr>
</tbody>
</table>

*Adjusted Odds Ratio by gender, age and maternal education.
area. However, the proportion of adolescents exposed to daily consumption of soft drinks was significantly higher among students who reported residing in the urban area.

A study conducted by Mendes and Catão\textsuperscript{19}, with teenagers (10 to 16 years of age) enrolled in two public schools of Formiga (MG), indicated a greater percentage of adequate consumption of fruit and vegetables among students who live in the urban area when compared to those living in rural areas. According to these authors, these data can be explained by the greater availability and accessibility of such food in urban areas. A recent research conducted by Suliburska et al.\textsuperscript{20} indicated that the youngsters from the urban area choose fruit and vegetables as their preferred food more often. Differences in eating habits of these teenagers may also be caused by economic and educational factors\textsuperscript{21}.

In this study, it was found that the place of residence was directly associated to the inadequate consumption of natural fruit juice and soft drinks, considering two contrasting dietary indicators. The juice is healthier, but the preparation is time consuming. Also, some fruit are expensive and require suitable hygiene prior to its consumption. On the other hand, soft drinks are cheaper, practical and have a longer expiration date. In the present study, as mentioned, it was observed a higher consumption of soft drinks among adolescents residing in urban areas, a result which converges with those reported in a survey carried out by Colić-Barić et al.\textsuperscript{22}, with Croatian schoolchildren ranging from 8 to 16 years of age, and with the study by Shi et al.\textsuperscript{23}, with Chinese students from 12 to 14 years of age.

A recent survey conducted by Estima et al.\textsuperscript{24} with adolescents (14 and 17 years of age) from a technical school in the metropolitan region of São Paulo, revealed an elevated consumption of processed fruit juice (38.1\%), followed by ordinary soft drinks (28.6\%), in detriment of other drinks such as natural fruit juice (22.2\%) and water (9.5\%). The authors mention that the main reason given for the consumption of soda was the flavor. In addition to that, cultural and environmental factors, such as family and friends influence on food choice and where this food is consumed (home, school, work) were other reasons which explained this elevated consumption. Andrade et al.\textsuperscript{25} found that food consumption among teenagers in the city of Rio de Janeiro was characterized by an elevated intake of food of poor nutritional value and high caloric content, like the industrialized ones (soft drinks, cookies, chocolate, ice cream), indicating high energy density for the total energy consumption.

It is important to pinpoint that the sample of this study included only adolescents enrolled in the state’s public high school, which limits the extrapolation of results to all adolescents of Pernambuco. Also, it was not possible to analyze if the frequency of consumption of other food was associated to the place of residence, due to methodological boundaries set during yet the planning of the study. However, the study presents positive aspects, with particular emphasis on the range (statewide) and on the sample size, sufficient to ensure prevalence estimates with reasonable accuracy. Moreover, as far as it is known, this is the first survey in the Northeast of the country to present differences in the frequency of food consumption among teenagers in rural and urban areas.

The data indicated in this study are noteworthy, because it was found that there is less consumption of natural fruit juice among adolescents, in detriment to an increase in the consumption of soft drinks.
soft drinks. Given these findings, it is suggested the implementation of informative actions in order to raise awareness among parents, teenagers, teachers, managers and the public sector as to the importance of consuming fruit, natural fruit juice and vegetables and low intake of soft drinks in order to adopt healthy eating habits. Besides that, strategies for nutrition education in the school environment could provide improvement in the students’ eating habits, since most teenagers spend a considerable amount of time in this environment. This scenario evidences the importance of government initiatives to invest in public programs, such as the National School Feeding Program (Programa Nacional de Alimentação Escolar).

CONCLUSION

Given the results presented, it can be concluded that the prevalence of occasional consumption of natural fruit juice was statistically higher among adolescents living in rural areas when compared to those living in urban area. The proportion of adolescents exposed to daily consumption of soft drinks was significantly higher among students who reported residing in the urban area.

This study provides the diagnosis of an unexplored reality and points out to the need for broader proportions research, which can help building an integrated policy of care, at municipal and state levels, for adolescents and their families, living in rural and urban areas. In future researches, the comparison between place of residence with other food and food groups may add new evidence to the available body of knowledge. Information on the location and the motives of consumption may help control the commercialization of industrialized beverages in schools.

The proposition for further researches, considering the size of the portions used in relation to the intake recommendations of these food in comparison to adolescent dietary intake by place of residence, will also be of great value in order to better adjust future interventions for the most vulnerable groups. Furthermore, it is suggested to analyze personal factors (taste preferences) and environmental (availability, accessibility, cost, cultural norms and quality of food) that may influence food intake in adolescents living in urban and rural areas, as identified in studies previous1-5.

REFERENCES


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